Space Weather Forecast

Issued on Tuesday, 19 March 2024 at 00:41 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares likely (R1-R2 Radio blackouts), slight chance of strong flares (R3 blackouts). Chance of G1 from Coronal Mass Ejection arrivals mainly Day 2 (20 Mar).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate, with the largest flare peaking at 18/1919 UTC from a new region in the southeast. There were two further Moderate-class flares, one originating from a region which has now rotated beyond the northwest limb, another from a new region in the northeast. There are currently eight sunspot regions on the visible disc. The two regions of most interest have both rotated on recently, one in the northeast (likely a region from the previous rotation which gave three Strong flares) which has a large main spot with clear magnetic complexity. The other is in the southeast and has many smaller spots, but is beginning to show some smaller areas of magnetic complexity. A region in the southwest has grown in recent hours, developing what appears to be some small and weak magnetic complexity. A further region in the northwest has also grown recently, after emerging less than 24 hours ago, and is also starting to show magnetic complexity. The remaining regions currently appear stable. No Earth directed Coronal Mass Ejections (CMEs) have been observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: Solar winds were indicative of ambient conditions, until a CME arrival around 18/1940 UTC. Wind speeds have been at ambient levels throughout, but jumped from near 300 km/s to around 350 km/s after the CME arrival. Interplanetary Magnetic Field was weak, but jumped to moderate with the CME arrival. The north-south component varied weakly at first, but became moderately southward directed after the CME arrival. Geomagnetic activity was Quiet to Unsettled (Kp0-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained slightly elevated after the S1 Minor solar radiation storm on 15-16 Mar, but on a slowly declining trend.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is now considered likely with a slight chance of becoming High with any isolated Strong flares, mostly due to the two new regions in the east, but with some growth in other regions suggesting these are worth watching too.

Solar Wind / Geomagnetic Activity: A recent CME arrival has been observed at Earth, and there is still the possibility of further glancing CME interaction through Day 1 (19 Mar), although this becomes less likely through the day. A further arrival is then expected on Day 2 (20 Mar), probably from the slower of the two CMEs from an eruption on 17 Mar, but perhaps also a glancing impact from the slightly faster and further south of these CMEs. Ongoing effects are possible on Day 3 (21 Mar), before easing. Aside from the CMEs, no other sources of notable enhancement to solar winds are forecast.

Geomagnetic activity is expected to be Unsettled to Active, with a chance of G1/Minor Storm conditions, perhaps on Day 1 with the current CME enhancement but more likely on Day 2 with the CME from the 17 March. Effects are then likely to decline through Day 3, becoming largely Quiet by Day 4 (22 Mar) in the absence of further CMEs.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to continue easing to background with a slight chance of further enhancements. This risk increases slightly later in the period.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	40	20	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	60	60	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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